REMARKS

Claims 1-10 are all the claims pending in the application. Claims 1 and 10 have been amended to more clearly point out the claimed invention. Support for the amendments may be found at, for example, page 5, lines 3-5, page 6, lines 1-4, and page 10, lines 10-12 of the specification. No new matter has been introduced and entry of the amendments are respectfully requested.

Specification - Abstract

The Office Action requires a new abstract of the disclosure which is presented on a separate sheet, apart from any other text. A new Abstract of the Disclosure on a separate sheet is provided herewith.

Claim Objections

Claim 6 stands objected as being in improper form allegedly because it refers to multiple claims. Applicants would like to point out that Claim 6 was amended to refer to Claim 1 through a preliminary amendment filed on February 9, 2005. A copy of the preliminary amendment is attached hereto for reference.

Therefore, it is respectfully requested to withdraw the objection to Claim 6.

Rejections of Claims 1 and 5-9

Claims 1 and 5-9 have been rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,571,244 to Knighton (hereinafter "Knighton"). Applicants respectfully traverse.

Knighton was relied upon to disclose a system ("debubbler") for eliminating gas bubbles from a liquid. The system comprises an inlet port (22) for receiving the liquid; a chamber (24) in which the liquid flows; a first outlet port (44) through which liquid can flow; a second outlet port (46) through which gas can pass; a hydrophilic filter (26), which is located between the chamber and the first outlet port, and passes liquids, but not gasses; and a hydrophobic filter (28), which is located between the chamber and the second outlet port, and passes gasses, but not liquids.

According to Knighton, the hydrophobic filter (28) can pass gasses which are present in the liquid (e.g., liquid medicines), but not the liquid which flows into the chamber (24) through the inlet port (22). The gases are forced out into the atmosphere through the second outlet port (46) which is bounded by the hydrophobic filter (28). On the other hand, the hydrophilic filter (26) can supply the liquid (medicine) through the first outlet port (44) into a patient. It is also described that the dual hydrophilichydrophobic filters (26, 28) and the dual outlet ports (44, 46) of the debubbler of Knighton make it possible to eliminate gas bubbles from the liquid medicine as well as injecting the liquid medicine (without gas bubbles) to a patient.

Claim 1 of the present application recites "A cap for a tube in which a liquid medicine flows, said cap being detachably connected to a distal end of the tube, comprising: a passage for communicating with the tube and the outside, and having an inlet port through which the medicine flows into the passage from the tube; a liquid absorption member disposed at or near the inlet port in the passage; and a gas permeable and liquid impermeable filter for blocking the passage at a position farther than the liquid absorption member from the inlet port, wherein said cap is detached from the tube when supplying the medicine to a subject."

There are several distinctions between the debubbler of Knighton and the cap according to the presently claimed invention. First, the cap of the present invention is removed from the tube when the liquid contained in the tube is supplied into a subject (e.g., a patient). By contrary, the debubbler of Knighton is kept connected to a tube during the injection of a liquid medicine from the tube into a patient.

For that reason, the debubbler of Knighton should have a structure wherein gases are first vented out to the atmosphere and then liquids (medicines), which are free of gases, are injected into a subject. In particular, the hydrophobic filter (28), which passes gases but not liquids, is located at a second outlet port forcing gases ventilated out into the atmosphere, while the hydrophilic filter (26), which passes liquids but not gases, is located at a first outlet port through which liquids flow.

By contrary, the cap according to the presently claimed invention allows an elimination of gases (in particular, gases present between liquids segments) before liquids are supplied into a subject. For this purpose, the cap of the present application comprises a gas permeable and liquid impermeable filter and a liquid absorption member, which are arranged so that the liquid of the tube contacts first the liquid absorption member when it flows into a passage of the cap from the tube. Thus, the liquid absorption member is disposed between the tube and the gas permeable and liquid impermeable filter.

Knighton fails to describe or suggest the features of the cap of the presently claimed invention as discussed above or the liquid medicine supplying apparatus comprising the cap.

Accordingly, it is believed that the rejection under 35 U.S.C. § 102(b) is not sustainable and it is respectfully requested that the rejection be withdrawn.

Rejections of Claims 2-4

Claims 2, 3 and 4 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Knighton in view of U.S. Patent No. 3,631,654 to Riely et al (hereinafter "Riely"). Applicants respectfully traverse.

Knighton and the differences between the teachings of Knighton and the presently claimed invention were discussed above with respect to the rejection under 35 U.S.C. § 102(b).

Riely was relied upon to disclose a gas purge device that is capable of separating gases and liquids. Referring to Fig. 3, Riely particularly describes a gas separator which uses a filter medium formed into a cylindrical section with a hemispherical end. It is described that the "thimble"-shaped filter material (34) is inserted into a housing (32), such that the cylindrical hydrophobic segment (35) is located within and directly contiguous to a perforated section (33) of the housing. According to Riely, the cylindrical hydrophobic segment (35) is located within and directly contiguous to a perforated section 33 of the housing. Gas and liquid enter through the inlet fitting (22), and only gas passes through the hydrophobic segment (35) and is vented to the atmosphere through the perforated section (33). It is also described that the hemispherical hydrophilic segment (36) passes the liquid, which is discharged as gas-free liquid through the outlet fitting (21).

Like the debubbler of Knighton, the gas purge device of Riely is kept connected to a tube during the injection of a liquid medicine from the tube to a subject. By contrary, the cap

according to the presently claimed invention is removed from the tube when the liquid contained in the tube is supplied into a subject such as a patient.

For that reason, the gas purge device of Riely should have a structure wherein gases are first vented out to the atmosphere and then liquids (medicines), which are free of gases, are injected into a subject. In particular, a hydrophobic segment (35) is located at an inlet port of the device to eliminate gases and a hydrophilic segment (36) is located at an outlet port of the device so that liquids free of gases can flow out.

By contrary, as discussed above, the cap according to the presently claimed invention allows an elimination of gases (in particular, gases present between liquids segments) before liquids are supplied into a subject. For this purpose, the cap of the present application comprises a liquid absorption member, which is disposed at or near an inlet port through which a liquid flows into a passage from a tube, and a gas permeable and liquid impermeable filter. The liquid medicine flown from the tube first contacts with the liquid absorption member and then with the gas permeable and liquid impermeable filter.

Neither of Knighton or Riely describe or suggest the features of the cap of the presently claimed invention as discussed above.

Moreover, the debubbler of Knighton or the gas purge device of Riely is not suitable for use as a cap located at the distal end of a tube for supplying a liquid medicine, because it cannot effectively eliminate bubbles present between liquid medicines segments. The hydrophilic filter cannot pass gas bubbles and, consequently, the gas bubbles are trapped between the hydrophilic filter and liquid medicine segment.

For the reasons discussed above, it is believed that the rejection of Claims 2-4 under 35 U.S.C. § 103 is not sustainable and it is respectfully requested that the rejection be withdrawn.

Rejections of Claim 10

Claim 10 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Knighton in view of U.S. Patent No. 6,520,935 to Jansen et al (hereinafter "Jansen"). Applicants respectfully traverse.

Knighton and the differences between the teachings of Knighton and the presently claimed invention were discussed above with respect to the rejection under 35 U.S.C. § 102(b).

Jansen was relied upon to disclose a flow control device adapted to be placed over a tip to prevent liquid flow.

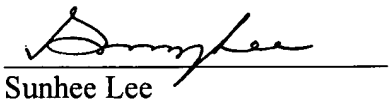
As discussed above, Knighton fails to disclose or suggest the cap according to the presently claimed invention. Claim 10 also has been amended to more clearly point out the feature that the flow control device comprises a member that is connected to the cap and is removed from the flow control device when the cap is detached from the tube.

In light of the discussion above, it is believed that the rejection of Claim 10 is not sustainable and Applicant respectfully requests that the rejection be withdrawn.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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WASHINGTON OFFICE
23373
CUSTOMER NUMBER

Date: September 19, 2006

Attachment: A copy of Preliminary Amendment filed February 9, 2005

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

KIM, Yong-Nyun

Docket No: Q86186

Appln. No.: Not yet assigned

Group Art Unit: Not yet assigned

Confirmation No.: Not yet assigned

Examiner: Not yet assigned

Filed: February 9, 2005

For: CAP OF TUBE FOR SUPPLYING LIQUID

PRELIMINARY AMENDMENT

MAIL STOP AMENDMENT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Prior to examination, please amend the above-identified application as follows on the accompanying pages.

TABLE OF CONTENTS

AMENDMENTS TO THE SPECIFICATION

Please replace paragraph no. 8, page 4 (which bridges over to page 9) with the following amended paragraph:

The tube 90 is connected to an end of the cylinder 64 of the injection apparatus 60. A passage for liquid medicine defined by the tube 90 is equipped with, for example, a supply valve 70 for supplying the medicine into the cylinder ~~90~~ 64 before using the apparatus. A clamp 72 is also provided to cut off a stream of medicine flowing along the tube 90 if necessary. The structure of the tube connected to the injection apparatus may be that disclosed in PCT Publication No. WO 02/11791 Al, and a relevant portion of details disclosed in PCT Publication No. WO 02/11791 Al is incorporated herein by reference. A distal end connection member 80 and a cap 10 for plugging an opening of the connection member 80 are connected to a distal end of the tube 90. When the medicine is injected into a human body, the cap 10 is removed and the connection member 80 is connected to an inlet of a member (e.g., catheter) directly inserted into the human body.

Please replace the first full paragraph, page 5 with the following amended paragraph:

Referring to FIG. 2, a cylindrical projection 84 is provided at an end of the connection member 80. The projection 84 is provided with a communication hole 86. The medicine is supplied through the hole 86. The connection member 80 is provided with a cylindrical wall ~~84~~ 82 surrounding the projection 84. Female threads are formed on an inner surface of the cylindrical wall 82 and are to be engaged with male threads on an outward extension 261 of the cap 10 to be described later. After the cap 10 is removed, the female threads are threadably

engaged with a connector of a catheter or the like. The threadably engaged portions are configured to be hermetically sealed.

Please replace the first full paragraph, page 6 with the following amended paragraph:

Referring to FIG 3, the absorption member 40 is a cylindrical member provided with a passage penetrating therethrough at the center thereof, i.e. an annular cylindrical member. In the present embodiment, the absorption member 40 is preferably made of a material that can absorb and hold a liquid well. Sponge that is a foam material, and fiber materials such as cloth may be used. As an example, a sponge made of melamine formaldehyde polycondensate may be used. However, the material of the absorption member in the present invention is not limited thereto. Any material that can absorb liquid well may be used. The absorption member 40 has inner and outer diameters such that it can be tightly fitted between an inner surface of the sidewall 22 and an outer surface of the inward extension 262 of the connection tube 26. An outer surface of the absorption member 40 is in contact with the sidewall 22 of the main body 20. One end of the absorption member is fixedly fitted into an annular space between the inward extension 262 of the connection tube 26 and the sidewall 22 of the main body 20. The other end of the absorption member is supported by the closure 30 to be described later.

Please replace the first full paragraph, page 7 with the following amended paragraph:

Referring to FIG 3, the insertion boss 34 comprises first to third extensions 35, 36 and 37 that are circular in cross section and have outer diameters sequentially decreased toward the end of the insertion boss. The outer diameter of the first extension 35 is determined to be in close contact with the inner surface of the sidewall 22 of the main body 20. This is to cause the insertion boss to be tightly fitted and prevent it from escaping when the closure 30 is fitted through the opening of the main body 20. Alternatively, the closure 30 may be coupled to the main body 20 by means of an adhesive so that they cannot be separated from each other. The second extension 36 has a diameter smaller than that of the first extension 35. There is a step between the first and second extensions 35 and 36.

Please replace paragraph no. 2, page 7 with the following amended paragraph:

The outer diameter of the third extension 37, which is smaller than that of the second extension 36, is determined such that the third extension can be tightly fitted into the liquid absorption member 40. There is a step between the second and third extensions 36 and 37. The third extension 37 is inserted lengthwise into the liquid absorption member 40. An outer surface of the third extension 37 is in close contact with an inner surface of the absorption member 40, and the end of the absorption member 40 abuts on the step between the second and third extensions 36 and 37. A distal end of the third extension 37 is tapered so that it can be smoothly inserted into the absorption member 40. The third extension 37 functions to prevent the liquid absorption member 40 from abutting on the air pass filter 50 or to prevent liquid absorbed by the liquid absorption member 40 from abutting on the air pass filter 50 due to outflow of the

absorbed liquid. If the liquid abuts on the air pass filter 50 or air exhaust hole ~~50~~ 321, air cannot be properly exhausted or it takes a great deal of time to exhaust the air.

Please replace paragraph no. 3, page 7 (which bridges over to page 8) with the following amended paragraph:

The air pass filter 50 is made of a liquid impermeable and gas permeable material and completely closes up the passage 321. That is, the air pass filter is made of a material through which liquid cannot permeate but gas can permeate. Preferably, the air pass filter 50 can be made and used by processing a porous plastic resin material having such a property into a shape suitable for the passage. Such a material for the air pass filter is available from Porex Corporation (website: www.porex.com) located at Fairburn, GA 30213, U.S.A. The product under the trademark "Porex Hydrophobic Vents" available from Porex Corporation may be used. This product is made of ~~polyethyle~~ polyethyl polytetrafluoroethylene. The material for the air pass filter is also available from Micropore Plastics, Inc. located at Stone Mountain, Georgia, U.S.A. The air pass filter 50 has such elasticity that it can be slightly shrunken while being fitted into the passage 321 of the closure 30 and then can be restored to its original state in place.

Please replace the first full paragraph, page 8 with the following amended paragraph:

Referring to FIGS. 2 and 3, air 91 exists just behind a portion of liquid medicine, which has first reached the end of the tube, within the tube 90. The portion of liquid medicine is introduced into the cap 10 through the communication hole 86 of the connection member 80. The first introduced portion of liquid medicine is completely absorbed by the liquid absorption member 40 having liquid absorbency before it abuts on the air pass filter 50. The portion of

liquid medicine that has already been absorbed by the absorption member 40 is prevented from again flowing into the air pass filter 50 by means of the third extension 37 of the closure 30. When the first introduced portion of liquid medicine is completely absorbed by the liquid absorption member 40, the subsequently introduced air ~~80~~ 91 reaches the air pass filter 50 and then naturally and completely escapes to the outside through the liquid impermeable and gas permeable air pass filter 50 and the air exhaust hole 321. Consequently, only liquid medicine remains within the cap 10. Then, the cap 10 is rotated to be separated from the distal end connection member 80 and connected to a catheter or the like, so that only the liquid medicine with air completely removed therefrom can be supplied.

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (original): A cap for a tube, said cap being connected to a distal end of the tube, comprising:

a passage for communicating with the tube and the outside;

a liquid absorption member disposed in the passage; and

a gas permeable and liquid impermeable filter for blocking the passage at a position farther than the liquid absorption member from the tube.

2. (original): The cap as claimed in claim 1, wherein the liquid absorption member surrounds the passage.

3. (original): The cap as claimed in claim 1, wherein the liquid absorption member is made of a sponge material.

4. (original): The cap as claimed in claim 1, wherein the liquid absorption member is made of a fiber material.

5. (original): The cap as claimed in claim 1, wherein the filter is made of a porous plastic resin material.

6. (currently amended): The cap as claimed in ~~claims 1 to 5~~ claim 1, further comprising:

a main body which includes an outer wall and a connection projection provided radially inward of the outer wall, and in which the other end opposite to an end of the main body with the connection projection provided thereon is open, and the passage is formed and the liquid absorption member is received; and

a closure which is connected to close the other open end of the main body and includes an exhaust hole that communicates with the passage and is blocked by the filter.

7. (original): The cap as claimed in claim 6, wherein the connection projection comprises a tube extending inward and outward of the end of the outer wall, and the absorption member is fixedly fitted between the outer wall of the main body and an inward extension of the connection projection.

8. (original): The cap as claimed in claim 6, wherein the closure further comprises an extension for isolating the absorption member and the filter from each other.

9. (currently amended): A liquid medicine supplying apparatus for supplying a liquid medicine, comprising:

a liquid medicine reservoir;

a pressure device for applying pressure to the liquid medicine stored in the liquid medicine reservoir;

a tube connected to the liquid medicine reservoir; and

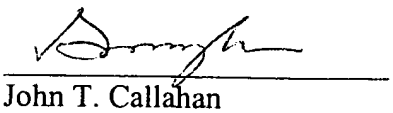
a cap according to ~~any one of claims 1 to 8~~ claim 1 connected to the distal end of the tube.

10. (original): The apparatus as claimed in claim 9, further comprising a flow control device including a member that is connected to the cap and is to be removed upon supplying the liquid medicine.

REMARKS

Entry and consideration of this Amendment are respectfully requested.

Respectfully submitted,



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